Greetings and welcome to the **OCTOBER 2014** edition of the WDFW Climate News Digest. Our purpose is to provide highlights of relevant climate change news, events and resources for WDFW staff. Feedback or suggestions for items to include in future editions are much appreciated – many *thanks* to those who have sent links and references and please keep them coming. Note that previous editions of the newsletter are now stored on the Habitat Program Sharepoint site and on the agency's climate change web page.

Thanks for contributions this month from Marc Hayes, David Price, Bob Vadas, Cynthia Wilkerson, Dan Siemann (DNR), David Patte (USFWS) and Ellie Cohen (Pt Blue Conservation).

WHAT'S HAPPENING AT WDFW?

November 17-18 Workshop on Stream Temperature and Coldwater Fisheries

WDFW staff are on the planning committee for a two-day workshop exploring the" Impacts of Climate Change on Stream Temperature in Coldwater Fisheries in the Pacific Northwest". The purpose is to bring together regulators and resource managers better understand and address the current and future changes in stream temperature due to climate change and the associated biological impacts in cold-water fisheries in the Pacific Northwest. Specific desired outcomes include identifying future science and data needs, as well as key management strategies from a regulatory, cultural, and ecosystem perspective. For more information, please contact Lynn Helbrecht.

"Taking Action", a progress report on the National Fish, Wildlife and Plants Climate Adaptation Strategy

Cynthia Wilkerson (Wildlife Program) participates on the Joint Implementation Team for this national strategy and contributed to the newly released 2014 Progress report. The report includes a case study of the Yakima River Basin Integrated Plan, as well as two other Washington based projects sponsored by the North Pacific Landscape Conservation Cooperative.

CLIMATE ADAPTATION AT OTHER ORGANIZATIONS

New Workbook for Developing Adaptation Plans from EPA

A recent publication from the Environmental Protection Agency (EPA), *Being Prepared for Climate Change: A Workbook for Developing Risk-Based Adaptation Plans*, provides guidance for conducting risk-based climate change vulnerability assessments and developing adaptation action plans. Learn More >>

LEARNING OPPORTUNITIES

New Seminar Series - Reading the IPCC Report

Ever wonder what the Intergovernmental Panel on Climate Change (IPCC) report says? Learn more on Tuesday and Thursday afternoons this fall during a seminar series by IPCC authors and contributors. This fall's focus is on Climate Change 2013: The Physical Science Basis (Working Group I's contribution to the IPCC 5th Assessment Report). Seminars take place in Boulder, Colorado, and will be webcast as possible.

View the schedule »

October 16th, 6:30-8:30 pm, "Climate Change from a Pacific Northwest Perspective", a talk featuring Ingrid Tohver, a research scientist from the Washington State Climate Impacts Group. The location is LOTT's WET Science Center, Olympia, WA, 500 Adams St, NE. Sponsored by South Sound Estuary Association's Discovery Speaker Series. The presentation begins at 7 pm and ends by 8:30 pm.

October 21st, 10-11:00 (Pacific time), "A Guide to Tools for Landscape Conservation Planning" by Patrick Crist and Kat Maybury of NatureServe

Through funding from the North Pacific Landscape Conservation Cooperative, NatureServe has created a guide to tools that support landscape-level conservation in the face of climate change for natural resources managers. This guide, based on surveys of tool needs for the region, emphasizes tools currently in use in the North Pacific region of the United States and Canada and augments with other proven tools. This webinar discussion will provide a brief overview of the guide and tools.
Register here. After registering you will receive a confirmation email containing information about joining the Webinar.

October 22nd, 9-10:00 (Pacific time), "Nuisance flooding, tipping points and sea level rise along the U.S. Coast", NOAA Science Seminar Series.

About the Speaker: Dr. William Sweet is an oceanographer with NOAA CO-OPS researching sea level rise, extreme events and their societal impacts. From the abstract: For over a century, NOAA tide gauges have been measuring relative sea level rise (SLR) along the U.S. coastline. A sensible consequence of relative SLR is an increase in nuisance flooding occasionally experienced during high tide. Associated impacts today are relatively minor, but their event frequency and duration are increasing across the country and accelerating along the East and Gulf Coasts. Tipping points when critical elevation thresholds for public works or coastal habitats become increasingly compromised by nuisance flooding in the future are suggested and shown to be surpassed much earlier than the 2100 time horizon for global SLR scenarios. **To join:** Remote Access: 1-877-708-1667. Enter passcode 7028688# For WEBCAST: Go to www.mymeetings.com. Under "Participant Join", click "Join an Event", then add conf. meeting no: 744925156; NO passcode is required for web

October 28th-30th, 2014, "Training: Climate-Smart Conservation", Olympia, WA.

Sponsored by the North Pacific LCC, this USFWS National Conservation Training Center course is based on the new guide 'Climate-Smart Conservation: Putting Adaptation Principles into Practice.' The course is designed to demystify climate adaptation for application to on-the-ground conservation.

October 30th, 10-11:00 (Pacific Time), "Educating the Public about Climate Change Threats Using Role-Play Simulations: The New England Climate Adaptation Project", by Carri Hulet of The Consensus Building Institute, Tonna-Marie Surgeon-Rogers of Waquoit Bay NERR, and Steve Miller of Great Bay NERR

Role-play simulations are experiential exercises that help community residents and decision-makers learn more about the scientific or technical issues being debated in various public policy controversies, such as whether and how to adapt to the risks associated with climate change. The New England Climate Adaptation Project (NECAP) is working with four at-risk coastal New England communities to: 1) assess local climate change risks, 2) identify key challenges and opportunities for adaptation, and 3) test the use of role-play simulations as a means to educate the public about climate change threats. As part of this project, science-based role-play simulations were developed for each of the four partner municipalities. If you are interested in conducting one of these role-play simulations in your town, workplace, or classroom, the full package of materials is available through http://necap.scripts.
Reserve your Webinar seat now at: https://www1.gotomeeting.com/register/889878488

January 14, 2015, Everett, WA, "Using Beaver to Restore Streams -- the state of the art and science"

Using beaver to restore streams is rapidly gaining acceptance as a cost-effective technique to improve aquatic habitat, especially for salmonids. Regulatory and institutional obstacles are being reduced or removed as scientific advances continue to demonstrate that beaver can restore stream habitat far more effectively, and at a much lower cost, than many traditional stream restoration approaches. Join us for an intensive 1-day workshop symposium for the beta release of a state-of-the-science manual regarding the use of beaver to restore streams. Workshops will be interactive with the audience as we walk through the manual and describe its use to facilitate the restoration of streams. We will provide assessment tools for determining how, where, and when to use beaver in stream restoration. http://northpaciflclc.org/News/09-02-2014/using-beaver-to-restore-streams-the-state-of-the-art-and-science

National Adaptation Forum Call for Proposals

The National Adaptation Forum is a biennial gathering of the adaptation community to foster information exchange, innovation, and mutual support for a better tomorrow. The Forum will take place from May 12 - 14, 2015 in St. Louis, MO. Proposals are being accepted for Symposia, Training Sessions, Working Groups, Poster Presentations, and a Tools Cafe. Click here for more information.

RESOURCES

Fifth Annual Pacific Northwest Science Conference – Videos and PDFs Now Available

Conference attendance continues to grow and this year's 459 attendees were a record. If you missed the event, check out scores of great presentation videos and pdfs available via the online agenda at: http://pnwclimateconference.org/program_oral.html . You can also browse the conference's YouTube channel at http://tinyurl.com/pnwcsc2014. Talks are grouped by general theme/session and ordered as presented at the conference.

September Climate Summary and Winter Outlook

The October edition of the OWSC newsletter is now available on the Office of the State Climatologist website (http://www.climate.washington.edu/newsletter/) and is attached to this email.
Topics include: September climate summary, winter preview and drought update.

Check out NOAA's Climate at a Glance Resource

Check out this tool from the NOAA National Climatic Data Center. Climate at a Glance was designed to provide near real-time analysis of monthly temperature and precipitation data across the contiguous United States and globally. Learn more >>

New Resource for Understanding Traditional Knowledges in the Context of Climate Change

This informational resource was developed by a self-organized, informal group and is useful for tribes, agencies, and organizations across the United States to build an understanding of how Traditional Knowledges may inform climate change initiatives. Learn More >>

Third Edition of Report on Climate Change Indicators in the United States Available Online and in Print

With help from partners, EPA has compiled the third edition of a Climate Change Indicators Report, presenting 30 indicators to help readers understand observed long-term trends related to the causes and

effects of climate change. The report describes the significance of these trends and their possible consequences for people, the environment, and society. To view the report online and/or order a copy, visit: http://www.epa.gov/climatechange/science/indicators/.

NOAA Announces Funding Opportunity on Ecological Effects of Sea Level Rise
NOAA's Ecological Effects of Sea Level Rise Program is seeking applications to support management of regional and local ecosystem effects of sea level rise and coastal inundation through targeted research on key technologies, natural and nature-based infrastructure, physical and biological processes, and model evaluation. The Program's goal is to integrate dynamic physical and biological processes with sea level rise and coastal inundation to improve the prediction of coastal ecosystem effects to enable enhanced coastal resiliency. Approximately 2 to 5 projects, 2-3 years in duration, are expected to be funded at the level of $150,000 to $200,000 per year per proposal. Eligible entities include institutions of higher education; non-profits; state, local, and tribal governments; commercial organizations; U.S. territories; and federal agencies. Applications are due on November 18, 2014. For more information, visit http://www.grants.gov/web/grants/view-opportunity.html?oppId=262398.

CLIMATE SCIENCE NEWS

August and June-August global temperatures each reach record high, driven largely by record warm global oceans *(from Science Daily)*
According to NOAA scientists, the globally averaged temperature over land and ocean surfaces for August 2014 was the highest for August since record keeping began in 1880. It also marked the 38th consecutive August with a global temperature above the 20th century average. The last below-average global temperature for August occurred in 1976.

Ocean data shows 'climate dance' of plankton, *(from Science Daily)*
The greens and blues of the ocean color from NASA satellite data have provided new insights into how climate and ecosystem processes affect the growth cycles of phytoplankton -- microscopic aquatic plants important for fish populations and Earth's carbon cycle. Michael J. Behrenfeld, "**Climate-mediated dance of the plankton",** *Nature Climate Change*, 2014; 4 (10): 880 DOI: 10.1038/nclimate2349

SPECIES AND HABITATS

The interactive effects of climate change, riparian management, and a nonnative predator on stream-rearing salmon, Lawrence et al (article attached)
Predicting how climate change is likely to interact with myriad other stressors that threaten species of conservation concern is an essential challenge in aquatic ecosystems.
This study provides a framework to accomplish this task in salmon-bearing streams of the northwestern United States, where land-use-related reductions in riparian shading have caused changes in stream thermal regimes, and additional warming from projected climate change may result in significant losses of coldwater fish habitat over the next century. Predatory, nonnative smallmouth bass have also been introduced into many northwestern streams, and their range is likely to expand as streams warm, presenting an additional challenge to the persistence of threatened Pacific salmon. The goal of this work was to forecast the interactive effects of climate change, riparian management, and nonnative species on stream-rearing salmon and to evaluate the capacity of restoration to mitigate these effects.

Are there places that buffer species from climate change? If so, where are they, and can species get there? *(CALCC)*

The California Landscape Conservation Cooperative funded a project to answer these questions by identifying climate change refugia and connectivity between meadows across the Sierra Nevada. This Climate Commons article presents a summary of the results, publications, and a workshop presentation from the project.

New modeling framework evaluates vulnerability of freshwater species *(from GNLCC)*

A research team has developed a new modeling simulation framework to help guide the management of freshwater species in the face of climate change and other cumulative stressors. The modeling framework combines genetic and demographic characteristics with environmental variables to predict how future stream warming may influence aquatic populations. In a pilot study, the team applies the framework to migratory bull trout populations and demonstrates that habitat fragmentation, caused by warmer water temperatures and barriers to fish movement, results in a loss of genetic diversity and a reduction in numbers. The researchers state that this "demogenetic" framework is useful to evaluate population vulnerability of freshwater species in a variety of riverscapes. Read more about this research:

- **Publication: Combining demographic and genetic factors to assess population vulnerability in stream species**
- Project page on Great Northern LCC website: Predicting effects of climate change on aquatic ecosystems in the Crown of the Continent Ecosystem

Do we have time to save species from climate change? *(from Science Daily)*

Climate change is expected to result in heightened risk of extinction for many species. An international team of researchers have recently published findings in the journal *Global Change Biology* which test the ability of warning systems to identify species vulnerable to climate change. They tested the performance of the IUCN Red List system, the most commonly used method for identifying species threatened with extinction. They used computer models to project the future abundance of 36 species of salamanders, turtles, tortoises, snakes and lizards under climate change. Next, the team performed "virtual" Red List assessments, following the IUCN guidelines to determine the Red List Status (e.g., "Critically Endangered") of each species throughout the simulation. The study, "Warning times for species extinctions due to climate change," funded by NASA, showed that the Red List system would provide several decades of warning time for species that might go extinct because of climate change. Jessica C. Stanton, Kevin T. Shoemaker, Richard G. Pearson, H. Resit Akçakaya. Warning times for species extinctions due to climate change. *Global Change Biology*, 2014; DOI: 10.1111/gcb.12721

Fish need time to adjust to new environmental conditions *(from Science Daily)*

Fish can live in almost any aquatic environment on Earth, but when the climate changes and temperatures go up many species are pushed to the limit. The amount of time needed to adjust to new conditions could prove critical for how different species cope in the future. In contrast to birds and mammals, fish are ectothermic, which means that their body temperature fluctuates in line with the temperature of their surroundings. Fish that live at different temperatures can generally do so because they are able to optimise their bodily functions to that particular temperature. Changes in the ambient temperature can therefore disrupt this balance. "Previous research has focused almost exclusively on whether different species will be able to survive an increase in temperature or not," says Erik Sandblom, researcher at the University of Gothenburg's Department of Biological and Environmental Sciences. "We were interested in finding out how species that survive actually manage to do so, how long it takes and the limitations they have to contend with during the acclimation period." E. Sandblom, A. Grans, M. Axelsson, H. Seth. Temperature acclimation rate of aerobic scope and feeding metabolism in fishes: implications in a thermally extreme

future. *Proceedings of the Royal Society B: Biological Sciences*, 2014; 281 (1794): 20141490 DOI: 10.1098/rspb.2014.1490

The following two articles (attached) address the relationship between global climate change, contaminants and environmental risk.
"Global Climate Change and Contaminants, a Call to Arms Not Yet Heard?", Landis et al (attached)
"Combined and Interactive Effects of Global Climate Change and Toxicants on Populations and Communities:, Moe et al (attached)
From the abstract: "A challenge for ecotoxicologists is to predict how joint effects of climatic stress and toxicants measured at the individual level (e.g., reduced survival and reproduction) will be manifested at the population level (e.g., population growth rate, extinction risk) and community level (e.g., species richness, food-web structure). The authors discuss how population and community level responses to toxicants under global climate change are likely to be influenced by various ecological mechanisms. Stress due to climate change may reduce the potential for resistance to and recovery from toxicant exposure."

Fine- and Coarse-Filter Conservation Strategies in a Time of Climate Change
A California Landscape Conservation Cooperative supported project exploring the effects of climate change on inland fishes of California published a new article:
Quinones, R. M. and Moyle, P. B. (2014). Climate Change Vulnerability of Freshwater Fishes in the San Francisco Bay Area. San Francisco Estuary & Watershed Science, 12(3). Click here to learn more about the products of this CA LCC project.

Changing forest water yields in response to a changing climate, Creed et al (article attached)
Climate warming is projected to affect forest water yields, but the effects are expected to vary. This study explores how forest type and age affect water yield resilience to climate warming.

POLICY AND MANAGEMENT - MITIGATION AND ADAPTATION

Georgetown Climate Center Releases 100 Recommendations to Improve Federal Programs to Prepare for Climate Change
The report, "Preparing Our Communities for Climate Impacts: Recommendations for Federal Action", draws from a series of workshops with leading federal, state and local officials and builds upon lessons learned post-disaster in New Orleans (following Hurricane Katrina), New York (following Hurricane Sandy), and Vermont (after Hurricane Irene). The report will inform the White House, State, Local and Tribal Leaders Task Force on Climate Preparedness and Resilience on more than 30 federal programs, initiatives and laws that can be used to prepare for extreme events such as storms, floods and heat waves, as well as rising seas. The report recognizes that recent extreme weather events and the mounting economic losses from such events have shown how vulnerable many states and communities are to climate change. Although state and local governments will be the primary actors when it comes to preparing for climate change impacts, the federal government can boost - or impede - preparedness. To learn more, visit: http://www.georgetownclimate.org/tags/adaptation.

EPA has just released a new video entitled, "Climate Change: The Cost of Inaction"
http://www.youtube.com/watch?v=1o8qlJ8jcx0

Reuters News Series Examines Flooding Increase Along Much of U.S. Coastline
Reuters released the first in a series of articles examining rising seas and associated effects on coastal

communities in the United States and the country's response to an increasingly watery world. This first article documents impacts to the Atlantic coastline, and in particular highlights sea level rise impacts on communities in the Chesapeake Bay area of southern Virginia. The next article in the series will discuss how U.S. policy promotes development along endangered shores. To read the series, visit: http://www.reuters.com/investigates/special-report/waters-edge-the-crisis-of-rising-sea-levels/.

Insurers, after White House meeting, emerged worried about more 'extreme weather' events
(from ClimateWire)

"Five insurance trade groups are promoting stronger building decisions to help counter a sharp rise in losses from extreme weather, prompted by a meeting on climate change between senior White House officials and industry leaders in June. The groups, whose memberships represent a large share of U.S. insurance companies, released a position statement yesterday that expresses their concern about climbing damage from weather events like hurricanes, floods, downpours and wildfires. It does not mention climate change explicitly, making some observers bristle, but instead emphasizes an ambitious transition toward damage prevention by improving land-use policies, strengthening building codes and funding stronger construction methods. The statement's subtext takes aim at federal policies that the insurance industry has long said contribute to poor development decisions that increase losses. "What we're talking about are extreme weather, adaptation, resilience, mitigation, climate-related issues -- whatever you'd like to call it," said Julie Rochman, president and CEO of the Insurance Institute for Business & Home Safety. "The administration calls it climate change. I think, from our perspective, it's really about weather events."

N.Y. law requires climate change into building decisions

New York Gov. Andrew Cuomo signed legislation yesterday requiring state agencies to assess the risks of climate change when approving projects like updates of wastewater treatment plants.
The New York bill (Senate Bill 6617), called the "Community Risk Reduction and Resiliency Act" and sponsored by Democratic state Sen. Diane and Assemblyman Robert Sweeney, amends the state's existing environmental conservation, agriculture and market, and public health laws to require consideration of the effects of climate change and extreme weather events before issuing state permits and allocating infrastructure funds (including grants to NGOs for conservation work).